

Physical activity in older adults

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VALORISATION

Given that the western population is rapidly ageing, the impact of decreased physical activity on public health poses relevant challenges. Preventing chronic and debilitating diseases is the first aim of western countries health policies for older adults, and the promotion of physical activity is an important component of these policies. Accelerometers can provide valid assessments of physical activity, which is important for understanding relations between physical activity and health and for providing personalised feedbacks for lifestyle interventions. The validation of an accelerometer in overweight to obese described in this thesis provides scientific evidence that prediction equations validated in lean subjects can be used in populations with higher BMI. A valid prediction of physical activity level and activity energy expenditure can contribute to weight loss interventions, as physical activity can contribute to the maintenance of a lower body weight. However, the precision of this prediction is far from ideal and about half of the variance in physical activity level remains unexplained.

A phenomenon that limits the precision of assessments of physical activity is that different activities show different relationships between the associated energy expenditure and acceleration output. Classification models allow the recognition of activities and the consequent development of prediction equations that are activity-specific. Additionally, adopting such classifications can reveal the contribution of physical activity types. In this thesis, a classification algorithm was used to show that walking is a major contributor to physical activity in older adults. The prediction model developed after the classification was more precise than a simple linear equation based on unclassified accelerometry output. Thus, the application of classification systems in daily life improves physical activity assessments, allows detecting specific contribution of walking to physical activity level and offers the possibility to provide individuals with personalised motivational feedbacks in order to promote physical activity.

In addition to types of activity, motivational feedbacks can consider different time of the day. This thesis showed that sedentary older adults were more prone to sedentary activities in the afternoon. More active individuals maintained their activity level for longer and were more aerobically fit. Accelerometers, and in general wearable devices, are capable of detecting sedentary time and can be used to prompt individuals to be more active at day times when they tend to adopt more sedentary behaviours. A possible application of the results of this thesis is the implementation of a system of feedbacks. A wearable device can provide the feedbacks to prolong active morning bouts of physical activity thus promoting patterns showed by fitter and more active individuals.

Overnight, wearable devices can predict parameters of sleep, such as sleep efficiency. Such ability allows unobtrusive assessment of sleep behaviours in daily life. Applications of this ability include monitoring sleep patterns and their changes over time.